received a Masters Degree in Deaf Education from the University of Tennessee and received a Graduate Fellowship Award.

- Author/Subcontractor with NIDRR/Great Lakes Disability and Business Technical Assistance Center for grant work on ADA Communication Access, Title III project, 1995-1996 completion.
- Board Member, US Architectural & Transportation Barriers Compliance Board (US Access Board) appointed by President Clinton, 1994-present. Technical programs - Chair, Ad Hoc Telecommunications Access Committee, 1996-1997.
- Member, National ADA Network and Implementation Training Group - received advanced training from DOJ and EEOC via Disability Rights Education and Defense Fund (DREDF). Among 400 individuals chosen for Phase I (1992) and 80 individuals chosen for Phase II (1993).
- Board of Directors, Wisconsin Advanced Telecommunications Foundation Board appointed by Governor Thompson, 1995-present.
- Public Member, WI Joint Legislative Council - Special Committee on the ADA, 1994 - completion.
- Chairperson, National Association of the Deaf ADA/Civil Rights Committee, 1995-1996. Member, National Association of the Deaf Telecommunications Committee.
- ADA Interdisciplinary Committee on Court-Related Needs of the Elderly and People with Disabilities - appointed by the Wisconsin Supreme Court Chief Justice: Chair-Communications sub-committee, 1993 - completion.
- Wisconsin ADA Partnership Committee, a subcommittee of the Wisconsin Governor's committee for People with Disabilities, 1992 - present.
- Statewide 9-1-1 ADA Accessibility Committee, 1995-1996 completion.

KAREN STRAUSS
National Association of the Deaf
814 Thayer Avenue, Silver Spring, Maryland, 20910-4500
Headquarters: 301-587-1788 voice - 301-587-1789 TTY, 301-587-1791 fax

Karen Pelz Strauss is Legal Counsel for Telecommunications Policy for the National Association of the Deaf. In this capacity, she represents deaf and hard of hearing communities on all matters pertaining to telecommunications access, including issues that concern telecommunications relay services, closed captioning of video programming, hearing aid compatibility, allocation of spectrum, and emergency access. Over the past several years, Ms. Pelz Strauss played a key role in authoring several significant pieces of federal legislation on telecommunications access, including Title IV of the Americans with Disabilities Act, requiring nationwide relay services, the Television Decoder Act, requiring television sets to be equipped with closed captioning decoding devices, and sections of the Telecommunications Act of 1996 which require access to telecommunications products and

services, and closed captioning of video programming. Throughout her legislative efforts, Ms. Peltz Strauss frequently has been called upon to testify as an expert witness before the United States Congress.

Ms. Pelz Strauss has written extensively on telecommunications access, has served on several national telecommunications advisory committees, and has given presentations at various national telecommunications conferences. Most recently, Ms. Pelz Strauss served on the Architectural and Transportation Barriers Compliance Board's Telecommunications Access Advisory Committee, which developed recommendations for the implementation of the 1996 Telecommunications Act's requirements for access to telecommunications products and services.

Prior to her work at the National Association of the Deaf, Ms. Pelz Strauss served as Supervising Attorney at the National Center for Law and Deafness at Gallaudet University for eleven years. IN 1993, she received the H. Latham Breunig Humanitarian Award for her outstanding efforts to expand telecommunications access for deaf and hard of hearing individuals. In July of 1996, she received a similar award from the Pennsylvania Law School and an L.L.M. from Georgetown University Law Center.

BILLY RAGSDALE
BIOGRAPHY UNAVAILABLE

TONI DUNNE
Texas Advisory Commission on State Emergency Communications, 333 Guadalupe St., Suite 2-212, Austin, TX 78701, 512-305-6918 v/tty, 512-305-6937 fax.

Toni Dunne is the Training and Access Program Manager for the Texas Advisory Commission on State Emergency Communications. She is responsible for the statewide program that assists 9-1-1 centers in providing access for Deaf, Hard of Hearing, and Speech Impaired citizens through the placement and training while serving as the agency's Americans with Disabilities Act (ADA) Coordinator.

Over the past 20 years, she have been involved with advocacy issues for the Deaf community and recently was awarded the 1997 "Robert H. Weitbrecht Award, given by Telecommunications for the Deaf Incorporated (TDI) for contributions made towards equal access to telephone emergency services. She is involved with a variety of organizations such as: the National Emergency Number Associations Accessibility Issues Committee Chair, CPE Committee Member and Texas Chapter President; the Association of Public Safety Communication Officials International's ADA Committee Chair, 911 Committee Member, and Operations Committee Member, and the National Association of the Deaf's 9-1-1 Access Committee Co-chair. Toni holds an Instructor Certificate

from the Association of Public Safety Communications Officials, and the Texas Commission on Law Enforcement Officers Standards in Education, as well as Interpreter Certification from the TX Board for Evaluation of Interpreters.

RON SCHULTZ
Ultratec Inc.
Vice President, Quality and Compliance
450 Science Drive
Madison, WI 53711
Phone: 608-238-5400
Fax: 608-238-3008
E-mail: Rschultz@ultratec.com

Ron Schultz serves as Vice President of Quality & Compliance at Ultratec, Inc. In this position, he is responsible fro the company's Quality System and all Compliance requirements for Ultratec, Inc. He is also intimately involved with new product design at Ultratec, Inc.

Ron is a graduate of the University of Wisconsin-Madison with a BS - Electrical & Computer Engineering and has been with Ultratec, Inc. since its beginning in 1978 working as a hardware Design Engineer, Engineering Manger, Vice President of Engineering and now in the position he currently holds. Ron has been and is currently involved with different industry groups for setting standards sponsored by the Electronics Industries Association, Canadian Standards Association and Underwriters Laboratories Inc.

JEFF CROLLICK
BIOGRAPHY UNAVAILABLE

ED HALL
BIOGRAPHY UNAVAILABLE

CHRIS WALLACE
BIOGRAPHY UNAVAILABLE

JEREMY PEMBLE

Manager of Government and Regulatory Affairs
Siemans Wireless Terminals

Related information:

- Chaired the GSM-NA Phase I Subcommittee on TTY Compatibility
- Served on the US Telecom Access Advisory Committee
- Work with PCIA E9-1-1 Coalition and TIA Section 255 Committee

- Siemans Wireless Terminals is a new division of Siemans AG which is manufacturing GSM and CDMA mobile phones for the North American market

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CHRISTOPHER KINGDON
BIOGRAPHY UNAVAILABLE

DICK BRANDT

Richard "Dick" Brandt specializes in consulting and representation in the domestic and international data communications standards process. In this capacity Dick provides advice on the development of standardization strategies and representation at standards forums.

A former AT&T manager, Dick has over 28 years experience in data communications and over 14 years experience in the standards process. He is Chairman of Telecommunications Industry Association (TIA) Technical Committee TR-30, Data Transmission Systems and Equipment and serves on the TIA Technical Standards Subcommittee (TSSC) which gives final approval to all TIA/EIA Standards, the TIA Technical Steering Committee which sets TIA technical policy, the US State Department's Information Technology Advisory Committee (ITAC) and the USA delegation to the ITU-T Advisory Group (TSAG).

In the past, in addition to being a member of various CCITT and T1 committees, he was Vice Chairman of ITU-T SG 14 Data Transmission over the Telephone Network, the Head of Delegation for the USA to ISO/IEC JTC 1/SC 6, Chairman of the Electronic Industries Association (EIA) TR-FO panel, EIA's representative on the ANSI Information Services Standards Board (ISSB) and a member of EIA Engineering Department Executive Committee (EDEC).

He is a contributing author to the Encyclopedia of DATA Communications and Encyclopedia of Microcomputers published by Marcel Dekker, Inc., the Telecommunications Journal of the ITU, Technology and Disability published by Butterworth and Heinemann and the Communications Standards Review published by Action Consulting.

He was the 1993 recipient of the Telecommunications for the Deaf Incorporated (TDI)'s "Robert H. Weitbrecht Award" for his work on the development of ITU-T Recommendation V.18 "Operational and Interworking requirements for modems operating in the text telephone mode." He also received an award from TIA for "Exemplary leadership and career contributions in the creation of national and international standards for data transmission".

He presently works primarily for Motorola and Gallaudet University. His client list has included AT&T, CISCO Systems, Paradyne Corporation, Rockwell International, Telebit Corporation.

ATTENDANCE

NAME	COMPANY	PHONE	FAX	E-MAIL
Almond, Ben	BellSouth Cellular	202-463-4112	202-463-4198	almond.ben@bsc.bls.com
Ander, Sidney	Krown TTY Mfg.	817-738-2485	817-738-1970	krowntty@aol.com
Baffer, Barbara	Ericsson	202-783-2200	202-783-2206	barbara.baffer@ericsson.com
Bennett, Gary	Lucent Technologies	630-979-0849	630-979-8431	gdbennett@lucent.com
Bonner, Brye	Motorola	847-576-5920	847-538-5564	bonner-CDYN30@email.mot.com
Brandt, Dick	Gallaudet, RERC-UTA	908-547-5026	908-547-5026	dbcon@worldnet.att.com
Brooks, Terri L.	Nokia	817-490-5991	817-491-5884	terri.brooks@ntc.nokia.com
Chow, Wendy	CTIA	202-736-3223	202-785-8203	wchow@ctia.org
Crollick, Jeff	SCC Communications	813-985-3581	813-985-3582	jeff_crollick@notes.scc911.com
Donovan, Diana	Lucent Tech's	630-979-5735	630-979-7423	diana@lucent.com
Dunn, Toni	TX 9-1-1 Comm	512-305-6918V/TTY	512-305-6937	tdd@earthlink.net
Erfanian, Javan	Bell Mobility	905-288-3299	905-288-3337	jaerfani@mobility.com
Feldman, Paul	Matsushita	703-812-0403	703-812-0486	feldman@fhh-telcomlaw.com
Gutierrez, Annabel	Nortel	972-684-1416	972-684-3881	annabel.gutierrez@nortel.com
Hall, Ed	CTIA	202-736-3259	202-466-7239	ehall@ctia.org
Hall, Lynsie	Contractor	410-489-2808	410-489-2806	
Harkins, Judy	Gallaudet University	202-651-5257	202-651-5476	jeharkins@gallaudet.edu
Hgato, Shahram	LMNG	202-828-9463	202-828-8405	lmng@fcclaw.com
Holmes, David	AT&T Wireless Services	425-828-1843	425-828-1848	david.holmes@attws.com
Holmes, Pam	Ultratec	608-238-5400	608-238-3008	pholmes@ultratec.com
Howe, Wesley	GTE Wireless	770-391-1727	770-395-8505	whowe@mobilenet.gte.com
Jayapalan, Jay	Motorola	847-632-4031	847-632-2900	jayapal@cig.mot.com
Kalenowsky, John	Motorola	847-523-7373	847-523-2350	wjk005@email.mot.com
Kelly-Frey, Brenda	State of MD/MD Relay	410-767-5891	410-767-4276	bkellyf@charm.net
Kim, Won	FCC	202-418-1310	202-418-7247	wkim@fcc.gov
Kingdon, Christopher	Ericsson, Inc	972-583-7970	972-583-5056	christopher.kingdon@ericsson.com
Kirkland, Latrice	Aerial Communications	773-399-8846	773-399-6846	kirl1@aerial1.com

Kuzchkanani, Ali	Lucas, McGowan	202-828-9486	202-828-8405	akuzehkanani@fcclaw.com
Madigan, Mary	PCIA	703-739-0300	703-836-1308	madiganm@pcia.com
McAllister, Mark	SBC Communications	512-372-5823	512-372-5891	mmcallister@tri.sbc.com
McLeod, Kevin	Gallaudet University	202-651-5875	202-651-5476	deafscribe@bigfoot.com
Melcher, John	Harris Co. 9-1-1	713-863-9911	713-864-9911	jmelcher@911.org
Moller, Paul	Motorola	847-523-5210	847-523-8274	paul_moller@css.mot.com
Montgomery, Bob	CTIA	202-736-3256	202-466-7239	rmontgomery@ctia.org
Neeley, Doug	Ericsson	972-583-0562	972-583-1809	doug.neeley@ericsson.com
Nguyen, Annie	Cox Communications	714-628-5164	714-623-5156	nguyen_annie@coxpcs.com
Panagotopulos, William	Comcast Cellular	609-220-0041	609-220-0041	panagotopb@comcell.com
Patrick, Mike	Pacific Bell Mobile Services	510-227-3015	510-227-3709	mpatrick@pacbell.mobile.com
Peltz Strauss, Karen	National Association of the Deaf	301-587-7466/301-587-1788	301-587-0234	kpstrauss@aol.com
Pemble, Jeremy	Siemans	972-997-7312	972-997-7386	jhpemble@siemans-wireless.com
Plummer, Bill	Nokia	202-887-0570	202-887-0431	william.plummer@ntc.nokia.com
Ragsdale, Billy	Bell South, NENA	404-329-4146	404-325-2798	bragsdal@bellsouth.net
Rayburn, Terry	Sprint PCS	816-559-64444	816-559-2181	t.rayburn@ieee.org
Roberts, Lisa	CTIA	202-785-0081	202-785-0721	lroberts@ctia.org
Rogers, Leon	NEC America	972-751-3345	972-518-5380	rogersl@ccgate.dl.nec.com
Ruby, Laura	AT&T Wireless Services	425-828-1354	425-828-8452	laura.ruby@attws.com
Sahin, Semih	Pacific Bell Mobile Services	510-227-4548	510-227-3238	ssahin@pacbell.mobile.com
Schultz, Ron	Ultratec, Inc.	608-238-5400	608-238-2008	rschultz@ultratec.com
Singer, Beth	Gallaudet RERC-UTA	202-651-5049	202-651-5476	bsinger@gallaudet.edu
Smith, Bennie	Nortel	615-734-4189	615-734-5189	bennie.smith@nt.com
Spann, Charles	Nortel	972-231-0162	972-685-3478	charles_spann@nortel.com
Stout, Claude L.	Telec. for the Deaf, Inc.	301-589-3786 (V)	301-589-3797	tdiexdir@aol.com
Suprock, John	Motorola	847-632-5370	847-435-9970	QA4884@email.mot.com
Sweet, Richard	QUALCOMM	619-651-8812	619-651-8962	rsweet@qualcomm.com

Thomas, Al	Bell South Cell	404-713-0361	404-713-0361	AL_THOMAS@BSCC.BLS.com
Tomcik, Jim	QUALCOMM	619-658-3231	619-658-2113	jtomcik@qualcomm.com
Velez, Ed	American Personal Comm	301-571-4070	301-214-9496	evelez@apci.com
Wallace, Chris	Nokia	972-257-9947	972-257-9988	chris.wallace@ntc.nokia.com
Wells, Ken	Lucent Technologies	908-878-8436	908-878-8001	kwells@lucent.com
Westbrook, Ray	GM ON Star	248-269-1362	248-269-1399	rwestbrook@onstar.com
Whritenour, Lee	Bell Atlantic Mobile	908-306-6485	908-306-6489	lwhrite1@ntc.mobile.bam.com
Wlliams, Norman	Gallaudet University	202-651-5257	202-651-5476	nswilliams@gallaudet.edu
Zan, Watson	Rogers Cantel	416-935-6031	416-935-7502	wzan@rci.rogers.com

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems
TTY/TDD FORUM - 3

Draft Report .01
(February 18, 1998)

February 11 - 12, 1998
TTY Forum - 3
Gallaudet Univ.

Washington, DC

This report will follow the structure of the agenda (included below) and will make the changes in agenda order agreed to and recorded in the opening remarks section. The agenda number will be used to precisely identify topics and will be offered out of numerical order to reflect the order in which each topic was presented during the forum. Several additional headings were added to accurately reflect the discussion topics added during the forum.

AGENDA

Forum Goal: ***Seeking Solutions to TTY/TDD Through Wireless Digital Systems***

9:00 AM

1. Call to Order & Opening Remarks	**Co-Chairs, CTIA/PCIA Judy Harkins, Host**
2. Introductions and Attendance Roster	
3. Review & Approve TTY Forum - 2 Summary	
4. Review & Approve Agenda	
5. Review TTY Forum 1 and 2 *Agreements*	**Steering Committee**
6. Introduction & Numbering of Contributions	
7. TTY Forum Administrative Issues	**Steering Committee[1]**
8. FCC Report and Order 97-402 - Clarification of December 1, 1998 deadline - Reporting Requierments	**Mike Altschul, CTIA**
9. WEIAD's Status Report to the FCC	**Ed Hall**
10. Working Groups	
• **Working Group #1/3: Performance of TTY Signals over Voice Services and Coupling**	**Wesley Howe Doug Neeley, Chairs**
• **Working Group #2: Performance of TTY Signals over Data Services**	**Brye Bonner, Chair**
1 Consumer Notification Strategy	**Laura Ruby**
2 FCC Status Report: Structure TTY Section	**Steering Committee**
3 How to Implement Solutions/Proposals	**Open Discussion**
4 New Business/Next Steps	**Co-Chairs**
5 Next Meeting	
6 Adjournment	***3:00 PM February 12th***

[1] TTY Forum Steering Committee: Toni Dunne; Billy Ragsdale; Claude Stout; Norm Williams; Jeff Crollick, John Melcher

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CALL TO ORDER AND OPENING REMARKS

Co-Chairs Mary Madigan, PCIA and Ed Hall, CTIA, call meeting to order. Judy Harkins, Gallaudet University, welcomed group.

INTRODUCTIONS AND ATTENDANCE ROSTER

Introductions made and attendance roster circulated. Recommendation by co-chair to move Agenda item #4 (Review and Approve Agenda) to follow Agenda item #2. Approved.

REVIEW AND APPROVE AGENDA

Recommendation to move Agenda item #11, Consumer Notification Strategy, to follow #8, FCC Report and Order 97-402.
Change approved, Agenda approved as amended.

REVIEW AND APPROVE TTY FORUM - 2 SUMMARY

Comments have been collected and changes made to report. Call for additional comments. No comments presented, chair moved to accept TTY Forum - 2 Summary. Report accepted. Recommendation made to separate the page of "Agreements Reached" from body of the report, making it an on-going page attached to succeeding reports allowing agreements to be added or changed by subsequent meetings. Report will note meeting at which additions and changes were made.

REVIEW TTY 1 AND 2 AGREEMENTS

(Note: An "Agreements" page will be attached as an Appendix to all TTY Forum Reports and will provide an on-going record of agreements reached and changes to existing agreements.)
Verify agreement:

- Short term solution - through vocoder
- Long term solution - possibly excludes sending BAUDOT tones through vocoder

Only the TTY Forum may change agreements reached by this body.
Call for comments. Hearing none, agreements are accepted.

New Additions to Agreements Page (see Appendix A for complete list of TTY Forum Agreements):

- 6 sponsored spots for identified consumer groups, relinquished if member misses 2 consecutive meetings.
- Accept modified "readability test" to be used by phone manufacturers to benchmark TTY over digital capabilities, to determine success rate for transport. (See Contribution TTY/98.02.11.06) Two tests: Manufacturers Readability Test, End User Test
- Error rate is defined as "character" not "bit" for the purpose of this forum. (Shift error rate of ratio 1/8 (i.e. 1 shift error causes up to eight text errors and will be counted as such) to be determined)

- Develop User Requirements Document. The outcome of Working Group #2. Represents the effort to provide for future advancements in technology by looking at solutions beyond 45.45 baud, Baudot.
- Define process to update Notification Document: refer updated information to CTIA to be distributed to T-CAT.

INTRODUCTION AND NUMBERING OF CONTRIBUTIONS

Call for contributions.

Numbering	Name of Contribution	(Agenda Topic #)
TTY/98.02.11.01	- Agenda	(01)
TTY/98.02.11.02	- TTY Forum - 2 Report	(02)
TTY/98.02.11.03	- Proposed Draft Text - TTYs and Wireless Phones	(11)
TTY/98.02.11.04	- Proposed E911 TTY/Digital Notification Strategy	(11)
TTY/98.02.11.05	- Ericsson Contribution	(10)
TTY/98.02.11.06	- Joint Task Force Working Group #1/3	(10)
TTY/98.02.11.07	- Ericsson - E9-1-1,TDD Compatibility to GSM	(10)
TTY/98.02.11.08	- Roster	
TTY/98.02.11.09	- FCC E9-1-1 Reconsideration Order FCC 97-402 (Note: Change made to reporting date - July 10, 1998 *not* June 10, 1998 as written)	
TTY/98.02.11.10	- Real Life Test Pattern	

TTY FORUM ADMINISTRATIVE ISSUES

Steering committee reviewed slots:
1 - SHHH
1 – Gallaudet University
1 - TDI
1 - ASHA
1 - NAD
1 - CAN
Slot assignments approved, contingent on whether ASHA wants their slot. If they do not want slot, their name will be dropped. The Wireless Industry will pay the meeting cost for the attendance of the above six members (five members, if ASHA drops out).

Proposed Rule: If organization does not send a representative for two consecutive meetings, the subsidized slot will be forfeited. The group will not be excluded, just will lose their funding (may petition for reassignment of slot).
Discussion:

- Karen Peltz-Straus, NAD, reported that ASHA may not want their slot, will just want to be informed. Recommends that groups not able to attend will give their proxy to another group and retain slots. Must maintain cognizance with issues.
- Billy Ragsdale, Steering Committee, clarified that the issue with loss of slots is that members who don't attend meetings can be disruptive if they don't keep up with issues. Perhaps the rule could be made less stringent but the issue recognized.

- John Melcher, Steering Committee, recommended that all meetings be held in Washington DC to accommodate needs of consumer organizations and ensure their ability to attend.
- Ed Hall, co-chair, stated that copies of the TTY Forum report are available to all at no cost. Information will be sent to all who request it.

Vote taken, one opposed. Rule is accepted.

FCC REPORT AND ORDER 97-402

Overview of Major Provisions:

- Analog in effect 12/1/97
- Digital enforcement suspended to 10/1/98
- Notification Requirements
- Reporting Requirements
- FCC's Wireless Telecommunications Bureau authority to extend compliance date to January 1, 1999, if necessary. Decision based on quarterly reports.
- Functional equivalents
- Phase I and Phase II E9-1-1 Requirements and Implementation Dates.

What does it mean?

- Commercial availability - Goal is operational by 10/1/98 all digital wireless systems have reliable and compatible TTY so PSAP and TTY user can easily communicate]
- Extent of availability - all digital
- Phased approach - Default to analog of compatible available for one type of digital - focus on having all systems operable

Notification Requirements

- wireless carriers whose systems are not compatible
- reasonable efforts to notify current and potential subscribers
- Message - TTY users will not be able to use TTYs to call 911 with digital
- FCC encourages w carriers to work with a TTY and (4 stakeholders) with respect to notification

Duration: Until compatibility problem solved. Order silent as to objective criteria as to acceptable error/compatibility

Reporting requirements
April 10
July 10
Oct 10

- Purpose of status reports
    - Monitor, encourage, ensure progress of the TTY Forum
    - Condition for suspension of enforcement of TTY requirement
    - Foundation for any future requests to FCC for further extension of compliance date

- Content of Status reports
  - Information regarding the problems associated with TTY access through digital wireless systems
  - proposed technical solutions
  - steps taken to achieve proposed technical solutions'
  - steps taken to notify current and potential subscribers
  - sufficiently detailed to assess progress
- Signatories to consensus agreement responsible for filing quarterly status reports
  - CTIA, PCIA, NAD, Gallaudet, TDI, CAN
  - Recommendation: TTY Forum Reports as basis for quarterly status reports

Functional Equivalents
FCC Determination in E9-1-1 Reconsider Order:

- Digital wireless carriers cannot rely on "functional equivalents" such as short-messaging text or data services compliant with international standards to meet obligations under TTY requirements
- Not appropriate or practical alternative for hearing and speech impaired persons in an emergency
- Such "functional equivalents" currently are little or no benefit to TTY user in an emergency , because few PSAPs are configured to accept short messaging services directly and not all PSAPs can accept ASCII type TTY calls and other types of data calls.

Discussion: In agreements reviewed this morning - refer to short and long term solutions -
Phase I and II requirements

- Phase 1 and 2 including the implementation dates apply to TTY calls, except Phase 1 requirements for TTY calls through digital wireless systems are deferred until 10/1/98

Phase 1 Implementation Date:
Analog Wireless systems April 1, 1998
Digital – October 1, 1998

- Phase 2 Implementation Date : Location for analog and digital wireless systems – October 1, 2001

CONSUMER NOTIFICATION STRATEGY

Summary:
Discussion centered on defining who must be notified, how to reach them, and what the information a Notification Letter should contain. The Notification Strategy Chart (Contribution WEIAD/98.02.11.04), analyzing the type of customer, possible methods of notification, messenger(s), and target delivery

date, was presented. A working group was formed to provide a proposed Notification letter to the group. Notification Letter was discussed day 2 and approved with modifications. Approved Notification Letter is included as Appendix B.

Laura Ruby, AWS, chair, presented the Notification Strategy Report. Message must be consistent to avoid confusing customers. Contribution WEIAD/98.02.11.04 - Notifications Strategy Chart - identifies customer type, possible methods of notification, messengers, target delivery date. Most customers are unaware of TTY and requirements and may have relative or friend who can use information. Most current customers using TTY have been in close communications with carriers/manufacturers. In some situations the carriers need help from manufacturers and consumer groups to reach consumers who are not in contact with service providers. Add the notification message to booths at Trade Shows, etc. TTY manufacturers are a key to the notification by identifying what the device can and cannot do.
Comments:

- Recommendation from CAN: Carriers must provide individual notification to all potential users, including researching to identify all deaf and hard-of-hearing persons, via mail.
- Only those who are potential customers need to be notified, not all people.
- Those making a decision may need information prior to purchase.
- Potential users need to do the research and be supported by their consumer groups
- Industry could notify consumer groups to get notification into their publications and meetings. Consumer groups need to take some responsibility and help wireless industry to ensure notification. There are cost related issues that cannot be discounted and groups need to work together to accomplish goal.
- Cooperation among groups is required to produce widely available notification, i.e. through websites, using the consistent, agreed-to format.
- Offer of help from equipment distributors, who distribute equipment for free.
- Carriers bear the responsibility for notification therefore burden of expense is on carriers to pay for all notification.
- Carriers are looking for wording from TTY Forum.
- Notification work effort is most important work from this meeting. Carriers feel sense of urgency to provide to carriers for immediate implementation.
- Problem with arriving at a consistent message in the next day is that the correct information is not necessarily known at this time.
- Can this group work on the message without having a process to disseminate information?
- Reason for this notification effort is to protect the consumer from making a bad purchase. This group should not expand the FCC requirement beyond what the intent was.
- Consensus on action team to be created to work on wording to report back to group. Request representation from all groups.
- TTY manufacturers are not represented at this meeting - Ameriphone, Krown,

and Ultratec.

Additional requirements have been set:

- Provide status report quarterly
- Consumer notification - requires an action team with large support group from consumer groups and with careful focus and agreement on content of notification message.

Effort for consensus on wording for Notification Message to be used by The Customer Awareness Team in producing their contribution.
Essential points:

- Background on TTY and technology issues.
- Reference to timeframe of information to ensure up-to-date information is shared
- Focus on TTY access. Groups could adapt message to accommodate special needs. Providers will work with groups to ensure accurate information.
- Analog section is controversial since some carriers cannot provide the analog fallback.
- What is commercially available solution for digital today - not what is technically possible.
- RJ-11 interface has not been proven. Acoustic coupling was proven for all phones at last TTY Forum.
- Identify whether dual mode phones can be locked into analog mode for duration of TTY calls.
- PCS is digital and has achieved adequate delivery of messages over TTY.
- CDMA/TDMA not proven.
- Need to provide generic message applicable to all technologies represented today.
- Message needs to be as clear to lay population as possible. Break message into technology and effect on TTY.
- Be careful to use universal terms so that deaf person can go to store and ask for "one of these" and have clerk understand terms.

WEIAD STATUS REPORT TO FCC

The WEIAD Status Report was delivered to the FCC on January 29, 1998. Anyone interested in a copy of the report can call Ed Hall at CTIA.

WORKING GROUP #1/3

Summary:
A contribution of text to use as an objective test of TTY over the air interface was presented. Test was accepted as modified by the addition of scenario-based text. Requirement was identified to develop a second, subjective, test. A working group, chaired by Toni Dunne, was formed to prepare a contribution of a subjective test to be presented at the next TTY Forum. Discussion centered on defining acceptable error rate, proper testing, and satisfying the FCC

requirements. Contribution WEIAD/98.02.11.06 and Contribution WEIAD/98.02.11.07 were presented to amplify the discussions of error rate measurement, lab testing, and potential solutions.

Wesley Howe, GTE Wireless, co-chair presented the Working Group #1/3 report. Established performance criteria with subset of a text message and established acceptable error rate. Group will provide consensus opinion to acceptability of testing and error rate.

Used 72 characters per line to eliminate carriage return as a variable. Specify inter-character delay pre-determined. Error rate is calculated on characters. Over 2500 characters included in test. Is the shift character characteristic of Baudot included in the test? No. The character sets are randomly set to include a lot of character transitions. The shift character rate is significant because the shift key error will cause the next character to be erroneously transmitted.
Comments:

- Noted that the recommended process at TTY Forum-2 was an actual example of an interactive 9-1-1 call script.
- Concern: ASCII output to the modem is not Baudot. We cannot simulate shifting here. Recommend using Baudot output to modem to more accurately simulate a real situation.
- Response from Group 1/3: Conferred with manufacturer who said equipment translates.
- Error rate even in highly trained PSAP call takers very high. Is it possible to reach consensus on error rate?
- Need to agree on some baseline to work from.
- Take Phased approach - get ballpark of examples of error rate 1% through 50% to try to establish consensus on acceptable error rate. Then ask questions of user and introducing increasing level of error to establish where limit of understanding is as related to error rate.
- Test must be able to be replicated. By making a recording of the test, the results are consistent over all systems and technologies.
- Tests in lab may not reflect field results. Human error adds dimension not considered by random, taped tests.
- User research determines the criterion. Group1/3 presented a way to determine error and the user determines if it's acceptable.
- Establish technical criteria, based on each company's evaluation of proper testing of equipment.
- Do both - use proposed test and then test by individual company criteria then bring tests back as information to group.
- Proposal to accept test.
- Artificial errors could exist in all calls.
- Proposed test is simple and no way to know what may affect test.
- Manufacturers need something valuable to test.
- Incorporate Toni Dunne's scenario-based text based on actual PSAP calls.

- Accept contribution as modified with scenario-based text.
- Discussion on error rate:
- Accept analog error rate at a PSAP to establish baseline.
- 9-1-1 trunks are engineered to a P.01 standard. The error rate will change based on caller, call taker and situation.
- 45.45 has always been sent via a voice path.

MODIFIED CONTRIBUTION ACCEPTED.

Discussion on Contribution TTY/98.02.11.06 (presented by Christopher Kingdon, Ericsson):

- Analog phones have an acceptable error rate - about 1% - 3%
- All domestic CDMA passes at 13kb - should work for TTY.
- Norman Williams provided test that showed that digital passed at an unacceptable rate. Need to do comparison of phones and digital technologies.
- Automated attendant at larger PSAPs to place call in queue is a problem to TTY.
- Question is when do you have a good electrical interface.
- Discussion on bit error rate vs. Character rate. Baudot is an analog protocol while bit error rate implies a digital protocol. Bit error rate implies error correction, character error rate relates to the test form.
- *Shift errors could impact the characters to next shift or end of the line. Error in transmission of shift could impact stream. Hitting the shift key will reset the next letters. PSAP operators are trained to hit space bar to correct garbled text.*
- 2.5 mm jack for hands free adapters gives easiest connection.

Vocoders used were the same; one just has more error correction.

Discussion on error rate:
Manufacturers cannot be held accountable for errors in the TTY protocol. Therefore, shift errors should only be counted as one air interface error. The additional errors are the problem of the TTY protocol. Manufacturers are responsible for providing acceptable interface for Internet, fax, modem, and have done so.
Error rates that are tolerable in other interfaces are small. The acceptable rates for the real world will be different from what engineers are accustomed to in fax, modems, etc.

Discussion on Contribution TTY/98.02.11.07(presented by Christopher Kingdon and David Fitzpatrick, Ericsson):
Ericsson included detail of lab report on PCS 1900 trials to answer questions from group regarding details of the Ericsson contribution at TTY-2.
In practice, a large percentage of phones are EFR and will be totally EFR in near future. The EFR vocoder performs at a lower error rate. Advancing technology has caused an improvement. It is not yet clear whether the error rate is acceptable but the errors are minimal. Big issue that remains is connection

between phone and TTY device. Ensure that there are a variety of price ranges available in the acceptable equipment. Some manufacturers of GSM equipment are prepared to negotiate with TTY manufacturers to provide interface. Vision includes an interface box to allow general compatibility. Will require some kind of conversion with a 2.5mm jack between phone and TTY device.
Aim for satisfying the requirements of FCC and then look to future to satisfy technology needed. TTY machines will have to be modified with jack and disable switch that activates acoustic coupler. Handset presented in TTY-2 will solve for embedded base. Shielding may be required to newer units. Manufacturers will need to focus on interface devices. Good market for entrepreneurs and forum does not want to impede any efforts in that area.

How do we determine a "reliable and compatible" TTY for effective PSAP communication?

- Benchmark text for manufacturers
- qualify error rate ("shift" error must be determined)
- true to life test script

Determine what can be done by Oct 1, 1998.

- acoustic coupler
- direct connect - but requires external battery, connection with phone and therefore adaptation for each manufacturer.

Use the handset as auto-jack, then pass audio to TTY.
If TTY just supplies dry audio - no intelligence, minimum requirement is two wires. Need Ultratec or TTY manufacturers to provide input/output specs and do they require voltage, ring, etc.
Manufacturers will meet with head of Ultratec to try to facilitate discussion under auspices of TIA. No standard to building the phone except four wire colors.

Question to group:
Is the TTY support issue solved if a WSP provides at least one digital phone model capable of TTY? By 10/1/98.
Comments:

- FCC must answer. But FCC will want to know if it's acceptable to consumer groups.
- Turn question around - Will all phones support TTY? NO. Some future phones may not be structured to allow interface of any kind due to small size or specific shape.

DAY 2
REPORT OF THE TTY CUSTOMER AWARENESS TEAM (T-CAT)

(Note: Notification Letter as modified and accepted by TTY-3 is attached as Appendix B)

Proposed Text in draft form was discussed. Intended to be simple and direct to assist users who are unfamiliar with wireless phones. Discussion of correct

adjectives to precisely define wireless phones as distinct from cordless or remote wireline handsets.

Discussion of availability of analog and digital adapters to identify whether any phones actually can send TTY today. Analog phones can provide TTY via several small handsets, and older models. Digital interface could be available shortly from Ericsson.

Distribution method is suggested by FCC but not mandated. Mandate is to provide notification.

Agreement to accept Notification Document as modified.

REPORT OF WORKING GROUP #2

Summary:
Proposal presented to direct Working Group #2 to focus their long term efforts on future technology such as Personal Assist Devices to allow the solutions to take advantage of technology innovations. Working Group #2 received approval to begin work on a User Requirements Document for this effort with the caveat that they produce a more detailed description of their direction for the next meeting. Working Group #2 requested more membership from the Deaf and Hard-of-Hearing group to assist in the development of the User Requirements Document.

Brye Bonner, Motorola, chair, and John Melcher, Harris County 9-1-1 presented report of Working Group #2.
Long Term effort is to evaluate digital wireless transport and establish benchmark expectations using lab tests.
Need to provide more services to those who need services most. Of the 28 million of hearing and speech impaired, how many are trying to place a 9-1-1 call over phones using a TTY device? Public Service proposal is to provide a Functional Equivalent.

Personal Digital Assist devices can now do both voice and digital 2-way text over wireless. Add one feature to provide an automated formatting interface to allow two way real time communications in Baudot. Interfaces are as cheap or expensive as required by a simple to elegant solution. Eliminate current system of relay that has human error and automate for communications relay without error. Can provide this system by October 1998? Not too optimistic. But can we get two way communications into the hands of the people who need it? A national distribution system could be put in place to put a PDA in the hands of all those who need it regardless of ability to pay. This is not modem pooling. It uses the wireless network, which is deploying faster and providing better nationwide coverage than the RAM modem system. There is an international effort ongoing to establish worldwide data standards. This group could submit requirements to be considered in the process. Recommend preparation of a SDO to submit

requirements to standards making organization to begin process of international standards development.

Request for consensus that this proposal represents the proper course of action for Working Group #2 in their search for a long-term solution.

Working Group #2 direction is approved to begin work on a User Requirements Document with requirement to produce a more detailed description of effort for the next meeting. Working Group #2 requests more membership from the Deaf and Hard-of-Hearing group to assist in the development of User Requirements Document.

FCC STATUS REPORT

Requirement to report to WEIAD to be included in their report to FCC and to follow reporting requirements of CC 97-402.

HOW TO IMPLEMENT SOLUTIONS/PROPOSALS

User Performance Test Development
Step 1 - Objective Test
Objective of test: provide manufacturers with a standard test that will provide a reliable measure of error rate in transmission over an air interface. Use Contribution TTY/98.02.11.10 - Real Life Test Pattern and add scenario-based modifications.
Accepted as modified.

Step 2 - Subjective Test - Chair of Working Group: Toni Dunne
Objective of test: What is acceptable error rate for end users with consideration that goal is for both parties understand each other.
Nature of test: Real time operation using a standard text. Shift error rate should possibly be calculated separately because of the impact on readability of text. User community can help determine impact after a shift error - it is averaged in the experience of users to be about 8 characters in a non-emergency situation. Compare to the missing of a shift to wireline errors and determine if the missed shift is attributable to the air interface.
Pass/Fail determine:

Acceptable error rate
-shift error rate calculated separately
-end user determines the acceptable rate
-landline shift error rate must be considered
-consider testing both end user parties
-recognize that PSAP call takers are trained to verify information (redundancy) to help reduce impact of shift errors
-find expert help in vocoder testing to assist in developing the test
-evaluators of test should include deaf and hard of hearing and PSAP call taker - consider testing both parties both called and caller

Name of Tests:
Throughput Accuracy Test (formerly Objective Test or Manufacturer Readability Test) to benchmark and calculate transport error rate.
Baudot Readability Test/End User Test (Subjective Test) Official name to be determined.
Test should replicate an end user in a real life situation (simulated in standard written text) and evaluate

NEW BUSINESS/NEXT STEPS

Questions for CONSENSUS:
Is the TTY support issue advanced if a WSP provides at least one digital phone model capable of TTY? By 10/1/98? Consumer groups say yes, if it includes all features that are available on other phones, is available at best cost, and has access to service on the digital network which seems to have better availability. FCC to address but will ask consumer groups. Question asked: will all phones support TTY? Answer: NO.

Is it acceptable in a dual mode (digital/analog) to have an interface turn off digital mode and enable analog mode only for TTY use if coupler is totally passive and requires no user intervention? Consumer group says not acceptable. Must focus on digital capabilities. CAN says that a digital solution that has features at the lowest price is acceptable. Consumers want to have equal access to what's available to the general public*.

*Clarification on comment by CAN received from Al Sonnenstrahl, CAN:

> I need to clarify my remark at the end of the previous meeting at Gallaudet University Kellogg Center last week.
>
> I made the comment that should there be one model, it should have all the features at the lowest price. I was referring to one model per manufacturer per technology... not one model per industry.

NEXT MEETINGS

April 1 and 2, 1998	**TTY Forum -4**	**Wash, DC**
May 20 and 21, 1998	**TTY Forum - 5**	**Wash, DC**

ISSUES FOR NEXT MEETING/ADJOURNMENT

1. Can TDMA/CDMA be sent over analog because of lack of confidence in dealing with the vocoder?
2. Remand statement draft re: "*TTY over digital, one phone per wireless service provider (WSP)*" to the steering committee to prepare as contribution to next meeting.

ATTENDANCE

NAME	COMPANY	PHONE	FAX	E-MAIL
Baquis, David	SHHH	301-657-2248 301-657-2249(t)	301-913-9413	dbaquis@shhh.org
Barclay, Deb	Lucent	630-979-5660	630-713-6215	d/barclay@lucent.com
Bonner, Brye	Motorola	847-576-5920	847-538-5564	bonner-CDYN30@email.mot.com
Brooks, Terri L.	Nokia	817-490-5991	817-491-5884	terri.brooks@ntc.nokia.com
Crollick, Jeff	SCC Communications	813-985-3581	813-985-3582	jeff_crollick@notes.scc911.com
Donovan, Diana	Lucent Technologies	630-979-5735		diana@lucent.com
Duff, Eileen	CTIA	202-736-3246	202-887-1629	eduff@ctia.org
Dunn, Toni	TX 9-1-1 Comm	512-305-6918V/TTY	512-305-6937	tdd@earthlink.net
Fitzpatrick, David	Ericsson	919-472-6633	919-472-7452	eus.eusdcf@memousa.ericsson.se
Hall, Ed	CTIA	202-736-3259	202-466-7239	ehall@ctia.org
Hall, Lynsie	Contractor	410-489-2808	410-489-2806	lynsie@erols.com
Harkins, Judy	Gallaudet University	202-651-5257	202-651-5476	jeharkins@gallaudet.edu
Howe, Wesley	GTE Wireless	770-391-1727	770-395-8505	whowe@mobilenet.gte.com
Jeffries, Tim	CTIA	202-736-3896	202-466-7239	tjeffries@ctia.org
Johnson, Richard	US Dept Ed	202-205-8515		richard_johnson@ed.gov
Jones, Gary	Omnipoint	301-951-2524	703-715-2365	gjones@omnipoint-corp.com
Kelly-Frey, Brenda	State of MD MD Relay	410-767-5891		frey@dbm.state.md.us
Kingdon, Christopher	Ericsson, Inc.	972-583-7970	972-583-5056	christopher.kingdon@ericsson.com

Moller, Paul	Motorola	847-576-5920	847-523-5564	paul-moller@css.mot.com
Munch, Paul	Omnipoint	973-257-2933	973-257-2912	pmunch@omnipoint-pcs.com
Neeley, Doug	Ericsson	972-583-0562	972-583-1809	doug.neeley@ericsson.com
Pangotopulos, William	Comcast Cellular	609-220-0041	609-220-0041	panagotopb@comceu.com
Parker, Virginia	Qualcomm Inc.	619-658-4789	619-651-8962	vparker@qualcomm.com
Peltz-Strauss, Karen	NAD	301-587-7466	301-587-1234	kpstrauss@aol.com
Ragsdale, Billy	Bell South, NENA	404-329-4146	404-325-2798	bragsdal@bellsouth.net
Ruby, Laura	AT&T Wireless Services	425-828-1354	425-828-8452	laura.ruby@attws.com
Samson, Ken	TDI	301-589-3006(tty)	301-589-3797	ksamsontdi@aol.com
Sonnenstrahl, Al	CAN	301-770-7555 (TTY)	same	sonny@clark.net
Spann, Charles	Nortel	972-231-0162	972-685-3478	charles_spann@nortel.com
Stout, Claude L.	Telec. for the Deaf, Inc.	301-589-3786 (V)	301-589-3797	tdiexdir@aol.com
Suprock, John	Motorola	847-632-5370	847-435-2346	QA4884@email.mot.com
Wells, Ken	Philips Consumer Communication			kwells@lucent.com
Whritenour, Lee	Bell Atlantic Mobile	908-306-6485	908-306-6489	lwhrite1@ntc.mobile.bam.com
Williams, Andrea	CTIA	202-736-3215	202-785-8203	awilliams@ctia.org
Wlliams, Norman	Gallaudet University	202-651-5257	202-651-5476	nswilliams@gallaudet.edu